

TAXONOMY OF THE *BRACHYCOME LINEARILoba* COMPLEX (ASTERACEAE)

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ABSTRACT

Carter, C. R. (School of Biological Sciences, University of Sydney, N.S.W., Australia 2006) 1978. Taxonomy of the Brachycome lineariloba complex (Asteraceae). Telopea 1 (5): 387-393.— Previously published results of extensive cytological studies are supplemented by morphological evidence to provide the basis of a revised classification of the *Brachycome lineariloba* complex. The newly described taxa are *B. breviscapis* C. R. Carter, *B. dichromosomatia* C. R. Carter and *B. dichromosomatia* var. *alba* C. R. Carter. *B. lineariloba* (DC.) Druce, as circumscribed here, includes three cytodemes (B, $2n = 12$; C, $2n = 16$; and E, somatic no. = 10).

INTRODUCTION

The most recent treatment of *Brachycome*† is by Gwenda L. Davis (1948). She observed a large variation in the size of the plants of *B. lineariloba* (DC.) Druce, noting that some fruiting plants were only 20 mm high. Davis also noted a discontinuity in the variation of the length of the ray florets, but could not correlate this with any other character. She attributed the variation in the lobing of the leaves to the length of the growing period and concluded that "It is not considered desirable to erect a new variety until further specimens are forthcoming".

Since then a great deal of work has been done on the cytology of this complex. The terms "chromosome species", "chromosome race" and "race" have been used in previous publications, and are used here in quotation marks when referring to previously published data. This usage probably reflected some uncertainty about the deserved taxonomic status of these entities at the time. I shall use cytodeme or deme (cytogamodemes, *sensu* Gilmore and Heslop-Harrison, 1954) to refer to these entities, except where formal taxonomic status is conferred. Smith-White (1968) reported three different chromosome numbers in this species. Later Smith-White and Carter (1970) reported a total of five "chromosome species" in the complex to which they referred as: A ($2n = 4$), B ($2n = 12$), C ($2n = 16$), D ($2n = 8$) and E (somatic number 10, forms four bivalents and two univalents at meiotic first metaphase). They also gave brief descriptions of the five "chromosome species" but did not attempt to define discriminatory characters or revise the taxonomy.

Kyhos, Carter and Smith-White (1977) have since proposed a detailed phylogenetic scheme for the five "chromosome races" based on several features: the number, morphology and behaviour of the chromosomes; meiotic analysis of hybrid plants; plant size and vigour; and ecogeographical considerations. The

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† Eichler (1965, p. 297) suggests that Cassini should not have changed *Brachycome* to *Braehycome*, and uses the former name. All the other papers cited here which refer to the species, have used the name *Braehycome*, and this paper will continue that familiar usage.

scheme proposed is unique and rather complex, but does not involve a polyploid series. On the basis of the evidence, "raees" A and D are deserving of separate specific status.

"Raees" B, C and E cannot be distinguished morphologically (even from living material) by any character other than chromosome number, although there is an increase in average size from E (the smallest) to B and C. There is, however, considerable overlap in size, and it cannot be used to discriminate effectively between the three "raees" which are treated as belonging to one species.

For cytogenetic purposes they may be distinguished as cytodesmes. Because they have already been used in several publications, the letters B, C and E should be retained to denote these cytodesmes. A microfiche photograph of the lectotype of *B. lineariloba* has been examined. The decumbent to ascending growth habit and the locality of collection both indicate that it must belong to one of the B, C or E cytodesmes. Therefore the specific epithet *lineariloba* must remain with these cytodesmes.

Raee A has also been divided into four cytodesmes on the basis of chromosome morphology (Watanabe, Carter and Smith-White, 1975). One of these (A_3) is deserving of varietal status as it is geographically disjunct and morphologically distinct, having pure white ray florets, as opposed to pale-blue in the other three cytodesmes. The small chromosomal differences (all have the same number, $n = 2$) and adjoining geographical distributions of demes 1, 2 and 4 are treated in detail by Watanabe et al., but are not considered to be of taxonomic importance.

All specimens cited are collected by S. Smith-White and C. R. Carter and are located in SYD. This departs from the usual practice of examining material from several herbaria, which I have been unable to do. However the collection at SYD contains more than 1000 specimens of this complex, and all those cited have been determined chromosomally. Most of the known range of the complex has been searched and sampled over a period of ten years. Thus the distributions given, although based only on SYD specimens, represent an accurate picture of the ranges of the species. It is at least as extensive as that given by Davis (1948) which was based on specimens from several herbaria. Specimens determined under the revised taxonomy will be donated to the major herbaria in Australia. Locations given for all specimens are listed approximately east to west. The distributions of the species and cytodesmes are given in Map 1.

KEY TO THE *BRACHYCOME LINEARILOBA* COMPLEX

1. Scapes erect, 30–250 mm long. Ligules 5–12 mm long, pale-blue or white. Margins of involueral bracts not usually pigmented, rarely reddish-purple .. *B. dichromosomatica* 2.
 2. Ligules pale-blue, at least on the undersides var. *dichromosomatica* a.
 - 2.* Ligules white var. *alba* b.
- 1.* Scapes decumbent to ascending, 1–200 mm long. Ligules up to 6 mm long, white. Margins of involueral bracts usually reddish-purple.
 3. Scapes 1–20 mm long, first-formed scape less than 10 mm long. Ligules less than 1 mm long *B. breviscapis* 3.
 - 3.* Scapes 10–200 mm long, first-formed scape more than 10 mm long. Ligules 1–6 mm long *B. lineariloba* 1.



Map 1. The distribution of the species and cytodemes are determined from specimens in SYD.

Notes to the Key

The only plants of *B. dichromosomatica* seen with reddish-purple margins on their involueral bracts were very large, and easily identified on the basis of habit and ligule length and colour. The smallest plants of *B. lineariloba* may be similar to the larger plants of *B. breviscapis* in terms of ligule and scape length. However, they are easily separated both in living plants and herbarium material. The smallest plants of *B. lineariloba* are exiguous in appearance with only one capitulum. The larger plants of *B. breviscapis* are more robust in appearance, and have several capitula.

TAXONOMY

1. *Brachycome lineariloba* (DC.) Druce in Bot. Soc. Exch. Club Brit. Isles 4: 610 (1917); Davis in Proc. Linn. Soc. New South Wales 73: 167–169 (1948), *pro parte*.

BASIONYM: *Steiroglossa lineariloba* DC., Prodr. 6: 39 (1838).

LECTOTYPE: Wet plains, Lachlan R., *A. Cunningham*, 29.vii.1817 (G-DC; microfiche seen).

TAXONOMIC SYNONYM: *Brachycome pachyptera* Turcz. in Bull. Soc. Imp. Naturalistes Moscou 24: 175 (1851).

HOLOTYPE: W.A., *J. Drummond 205* (KW). A photograph has been requested, but has not, as yet, been seen. There is a presumed isotype in MEL.

Habit: decumbent to ascending ephemeral to 150 mm high. *Leaves* usually basal, sometimes arising from lower part of scapes, up to 80 cm long, pinnatisect; segments 3–9, up to 13 mm long, 1 mm broad, obtuse, occasionally with a short filiform proximal lobe. *Scapes* decumbent to ascending, glabrous, nearly naked, 10–200 mm long. *Capitula* 1–60, up to 13 mm diameter. *Involueral bracts* 8–13, 3.5–5 mm long, 2–4 mm broad, ovate to broadly obovate, obtuse; margins entire to lacinate, usually reddish-purple. *Ligulate florets* 6–14; ligules 1–6 mm long, 0.5–1.3 mm broad, white. *Disc florets* 10–35. *Receptacle* 2–3 mm broad, 1.5–2 mm high, hemispherical, moderately to deeply pitted. *Fruit* broadly euncate; body terete; wings turgid, demarcated from body by a groove, with silky glandular hairs up to 2 mm long on the margins. *Pappus* conspicuous, 1–1.5 mm long; bristles of unequal length, fused in bundles. *Chromosomes*: cytodeme B— $2n = 12$; C— $2n = 16$, E—somatic no. = 10.

DISTRIBUTION: Western New South Wales, northwestern Victoria, southern South Australia, along the coast of the Great Australian Bight and the Kalgoorlie region of Western Australia.

SELECTED SPECIMENS EXAMINED: NEW SOUTH WALES: (Cytodeme C— $2n = 16$). 58 km SE. of Lake Cargellico, 6795, 7.1970; 68 km NE. of Hay, 6772, 7.1970; 44 km W. of Cobar, 4203, 7.1969; 73 km E. of Wilcannia, 2095, 8.1968; 5 km N. of Mossgiel, 6721, 7.1970; 11 km W. of Broken Hill 8006, 8.1971; 3 km E. of Pooncarie, 6703, 7.1970.

(Cytodeme B— $2n = 12$). Willbriggie, 6804, 8.1970; 44 km W. of Darlington Point, 6813, 8.1970; 39 km NE. of Hay, 6770, 7.1970; 11 km S. of Mossgiel, 6726, 7.1970; 5 km W. of Wentworth, 6859, 8.1970.

VICTORIA: (Cytodeme C— $2n = 16$). 6 km N. of Ouyen, 6846, 8.1970.

(Cytodeme B— $2n = 12$). 26 km E. of Warracknabeal, 6833, 8.1970; 20 km NE. of Nhil, 6837, 8.1970; 6 km S. of Nhil, 6836, 8.1970; 3 km S. of Red Cliffs, 6851, 8.1970.

SOUTH AUSTRALIA: (Cytodeme C— $2n = 16$). Manna Hill, 8013, 8.1971; 16 km E. of Blinman, 4800, 8.1969; 20 km N. of Hawker, 6918, 8.1970; 14 km N. of Leigh Ck., 4840, 8.1969; 50 km W. of Marree, 4847, 8.1969; 16 km W. of Pimba, 8068, 8.1971; 150 km N. of Kingoonya, 8088, 8.1971.

(Cytodeme B— $2n = 12$). 23 km E. of Renmark, 6866, 8.1970; 26 km S. of Loxton, 6870, 8.1970; 8 km E. of Lamaroo, 6876, 8.1970; 2 km W. of Karoonda, 6879, 8.1970; 7 km N. of Milendella, 6882, 8.1970; 14 km N. of Carrieton, 6892, 8.1970; Cradock, 2127, 8.1968; 20 km N. of Hawker, 6919, 8.1970; Wilpena, 6909, 8.1970; 15 km NW. of Port Augusta, 236, 8.1967; 65 km S. of Nonning, 7116, 9.1971, 16 km W. of Rudall, 6948, 8.1970; 46 km W. of Rudall, 6967, 8.1970; 26 km N. of Mt. Wedge, 7057, 8.1970; 60 km NE. of Wirrulla, 7104, 8.1970; 25 km N. of Eyre Hwy, towards Cook, 7087, 8.1970.

(Cytodeme E—somatic no. = 10). 33 km E. of Murray Bridge, 6880, 8.1970; 1 km N. of Murray Bridge, 6881, 8.1970; 16 km W. of Rudall, 6949, 8.1970; 46 km W. of Rudall, 6958, 8.1970; 50 km S. of Lock, 7007, 8.1970; Mt. Wedge, 4715, 8.1969; 15 km N. of Mt. Hope, 7022, 8.1970; 28 km NE. of Wirrulla, 7101, 8.1970; Laura Bay, 8878, 9.1972; Point Sinclair, S. of Penong, 8512, 9.1971; 16 km S. of Koonalda on coastal cliffs, 7094, 8.1970; Wilsons Bluff, E. of Eucla, 8497, 9.1971.

WESTERN AUSTRALIA: (Cytodeme C— $2n = 16$). 3 km N. of Kambalda, 8454, 9.1971.

(Cytodeme B— $2n = 12$). 3 km N. of Kambalda, 8456, 9.1971; 45 km N. of Salmon Gums, 8436, 9.1971.

(Cytodeme E—somatic no. = 10). 20 km S. of Caiguna Tank, near Point Dover, 8489, 9.1971.

2. *Brachycome dichromosomatica* C. R. Carter, sp. nov.

Scapi erecti 30–250 mm alti. Ligulae 5–12 mm longae pallide cyanaeae vel albac. Bracteae involucri plerumque marginibus aehromaticis.

HOLOTYPE: '15 km NW. of Port Augusta, S.A. (originally labelled "9 m N. of P.A."): S. Smith-White and C. R. Carter 2339, 25.viii.1968 (NSW).

Habit: erect ephemeral, up to 250 mm high. *Leaves* basal or arising from the lower part of the scape, sometimes sheathing the lower part of the scape, up to 80 mm long, pinnatisect; segments 5–9 up to 15 mm long, 1 mm broad, obtuse, occasionally with a short filiform proximal lobe. *Scapes* glabrous, naked except for basal portion, erect, 30–250 mm long. *Capitula* 1–70, up to 13 mm diameter. *Involucral bracts* 8–13, 3.5–6 mm long, 1.5–4 mm broad, ovate to broadly obovate, obtuse; margins entire to lacinate, not usually pigmented, rarely reddish-purple. *Ligulate florets* 8–16; ligules 5–12 mm long, 1.5–4 mm broad, pale- to mid-blue or white. *Disc florets* up to 50. *Receptacle* 2–3 mm broad, 1.5–2 mm high, hemispherical, moderately to deeply pitted. *Fruit* broad-euneate, 3–5 mm long, 1.5–2 mm broad; body terete; wings turgid, demarcated from body by a groove, with silky glandular hairs up to 2 mm long on the margins. *Pappus* conspicuous, 1–1.5 mm long, bristles of unequal length fused in bundles. *Chromosome number*: $2n = 4 + 0-3$ large B chromosomes. At metaphase I of meiosis in plants with two B chromosomes three bivalents are regularly formed and such plants would appear to be $n = 3$ (Carter and Smith-White, 1972).

a. var. *dichromosomatica*.

Ligules mid- to pale-blue, at least on the underside.

DISTRIBUTION: Flinders Ranges and surrounding areas of South Australia.

SELECTED SPECIMENS EXAMINED: SOUTH AUSTRALIA: 21 km E. of Copley, 4816, 8.1969; Brachina, 2241, 8.1968; 20 km N. of Hawker, 6920, 8.1970; Cradock, 2126, 8.1968; 15 km N. of Simmonston, 4764, 8.1969; 25 km E. of Quorn, 2330, 8.1973; 15 km NW. of Port Augusta, 2339, 8.1968; Uro Bluff, 4690, 8.1969; 8 km NW. of Pimba, 2427, 8.1968; 50 km W. of Port Augusta, 4738, 8.1969.

b. var. alba C. R. Carter, var. nov.

Ligulae albae. Habitat in regione Wilcanniae, Nova Wallia Australis.

HOLOTYPE: 120 miles W. of Cobar (90 km E. of Wilcannia), New South Wales, S. Smith-White and C. R. Carter 4247, 2.vii.1969 (NSW).

Ligules white.

DISTRIBUTION: Region of Lake Poopeloe, E. of Wilcannia, N.S.W.

SELECTED SPECIMENS EXAMINED: NEW SOUTH WALES: "Volo" 70 km E. of Wilcannia, 4348, 7.1969; 90 km E. of Wilcannia, 4213, 7.1969; 90 km E. of Wilcannia, 4267, 7.1969.

3. Brachycome breviscapis C. R. Carter, sp. nov.

Scapi decumbentes vel ascendentes 1–20 mm longi sed ille primigenus quam 10 mm brevior. Braectae involueri marginibus plerumque purpurascentes. Ligulae quam 1 mm breviores.

HOLOTYPE: 10 km S. of Elliston, S.A., S. Smith-White and C. R. Carter, 7042, viii.1970 (NSW).

Habit: stemless ephemeral up to 20 mm high. *Leaves* forming a basal rosette up to 20 mm long, entire or pinnatisect, segments 1–4, up to 5 mm long, 1 mm broad, obtuse, occasionally with a short filiform proximal lobe. *Scapes* glabrous, naked, 1–20 mm long, first-formed scape less than 10 mm long. *Capitula* 1–10, up to 6 mm diameter. *Involucral bracts* 8–9, 3–4 mm long, 1.5–4 mm broad, ovate to broadly obovate, obtuse; margins entire to lacinate, usually reddish-purple. *Ligulate florets* 4–10; ligules less than 1 mm long, less than 1 mm broad, white. *Disc florets* 5–20. *Receptacle* 1.5–2 mm broad, 1–1.5 mm high, hemispherical, moderately to deeply pitted. *Fruit* broad-cuneate, 1.5–2.5 mm long, 1–1.5 mm broad; body terete; wings turgid, demarcated from body by a groove, with silky glandular hairs up to 1 mm long on the margins. *Pappus* conspicuous, 1–1.5 mm long, bristles of unequal length and fused into bundles. *Chromosome number* $2n = 8$.

DISTRIBUTION: Western coast of Eyre Peninsula, South Australia.

SELECTED SPECIMENS EXAMINED: SOUTH AUSTRALIA: 50 km S. of Lock, 6993, 8.1970; 15 km N. of Mt. Hope, 7026, 8.1970; Mt. Wedge, 4722, 8.1969; 10 km S. of Elliston, 7042, 8.1970; Laura Bay, 8877, 9.1972.

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